Project Database of ICP Forests

PROJECT DESCRIPTION

PROJECT INFORMATION

Project title:	**Examining Forest Decline in Central Europe using Satellite Time Series Data and Deep Learning Methods**
Project ID:	266
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The requested data is meant to support my work in the 'Future Forest' project. My sub-project within Future Forest is about the detection of forest decline using satellite time series data.

The data concerning crown condition and defoliation from ICP Forests can be used as an indicator of forest health. Since the ICP Forests dataset also contains the date of measurement and coordinates of the plots, it provides spatially explicit forest health indicators. If available, an exact delineation of the plots (or shape and size of the plots in order to reconstruct them) would be very helpful. Additionally, data from the year 2015 onwards would be best, since in this year, the Sentinel-2 satellite mission was launched by the European Space Agency. The latter has a high temporal resolution and will help to mitigate a possible lack of data (still, all the data will be helpful, since the Landsat mission from NASA can be used as well). Using these data, we can download and process satellite time series data (e.g. from Google Earth Engine) for the plot locations and measurement dates, e.g. for the preceding year. The forest health indicators will be used as target data for model training.

Concerning the statistical method, the proposed research is meant to be conducted using deep learning-based time series analysis (Recursive Neural Networks). The model will be trained to detect forest decline in satellite time series. Afterwards, we want to detect the relevant time frame within the time series to investigate the effect of disturbance on the time series. This might enable us to relate these time steps to ecological and meteorological variables. This will help to verify the network's decisions.

The tasks of the project are:

- Which forestal and ecological indicators effect forest health and satellite time series, and how? For answering this question, we can use data about biodiversity, stand age, etc. from ICP Forests.
- Are deep learning models superior in comparison to existing forest decline detection algorithms such as BFAST and LandTrendr?